



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.         | CONFIRMATION NO. |
|---|-------------|----------------------|-----------------------------|------------------|
| 10/663,691  | 09/17/2003  | Yasuhisa Inao        | 00684.003542.               | 5236             |
| 5514 7590 03/27/2007<br>FITZPATRICK CELLA HARPER & SCINTO<br>30 ROCKEFELLER PLAZA<br>NEW YORK, NY 10112 |             |                      | EXAMINER<br>RUGGLES, JOHN S |                  |
|   |             |                      | ART UNIT<br>1756            | PAPER NUMBER     |
| SHORTENED STATUTORY PERIOD OF RESPONSE  |             | MAIL DATE            | DELIVERY MODE               |                  |
| 3 MONTHS  |             | 03/27/2007           | PAPER                       |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/663,691             | INAO ET AL.         |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | John Ruggles           | 1756                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 12 February 2007.  
 2a) This action is **FINAL**.      2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1,4 and 18-20 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1,4 and 18-20 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 03 March 2006 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_.

**DETAILED ACTION**

***Response to Amendment***

In the current 2/12/07 submission, claim 1 is currently amended, claims 2-3 and 5-17 are cancelled, claims 4 and 18 remain as previously presented, and new claims 19-20 are currently added. Therefore, only claims 1, 4, and 18-20 remain under consideration.

The previous drawings objections numbered (vi)-(ix) are withdrawn in view of Applicants' current amendment.

In view of the current amendment, the previous objections to the title and the abstract, as well as the previous specifically exemplified objections to the specification numbered (14)-(16), are each withdrawn. However, additional objections to the specification remain as further exemplified below.

The previous rejection of claims under the second paragraph of 35 U.S.C. 112 is withdrawn in view of the current amendment.

The current amendment has overcome the prior art rejections under 35 U.S.C. 103(a), but this current amendment has also necessitated the newly revised prior art rejections set forth below.

***Drawings***

The previous drawings objections numbered (vi)-(ix) are withdrawn in view of Applicants' current amendment.

***Specification***

In view of the current amendment, the previous objections to the title and the abstract, as well as the previous specifically exemplified objections to the specification numbered (14)-(16),

are each withdrawn. However, additional objections to the specification remain as further exemplified below.

35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is still replete with terms, which are not clear, concise and exact. The specification should again be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some remaining unclear, inexact or verbose terms used in the specification are: (13) Applicants are again requested to correct all errors throughout the specification of which they become aware, especially when such errors are similar to those previously listed and further exemplified below; (17) at page 23 lines 21-22, "the film cannot be well closely contacted" should be changed to --the film cannot be [[well]] closely contacted--; (18) at page 25 lines 10-11, "In order to avoid such a problem of uniformness" is unclear about the non-uniformity problem addressed in this passage and should be corrected (e.g., to --In order to avoid such a problem of uniformness--, etc.), similar changes should also be made throughout the specification (e.g., at page 52 lines 4-5, etc.); and (19) at page 35 lines 25-26, the relative distance range between the mask small opening 432 (from which near-field light escapes) and the resist 720 "are approximated relatively to each other up to a distance not greater than about 100 nm" should be clarified to --are approximated relatively close to each other up to a distance not greater than about 100 nm--, if this better describes Applicants' original intention. Note that due to the number of errors, those listed here are merely examples of the corrections needed and do not represent an exhaustive list thereof.

Appropriate correction is required. An amendment filed making all appropriate corrections must be accompanied by a statement that the amendment contains no new matter and

also by a brief description specifically pointing out which portion of the original specification provides support for each of these corrections.

***Claim Rejections - 35 USC § 112***

The previous rejection of claims under the second paragraph of 35 U.S.C. 112 is withdrawn in view of the current amendment.

***Claim Rejections - 35 USC § 102/103***

The current amendment has overcome the prior art rejections under 35 U.S.C. 103(a), but this current amendment has also necessitated the newly revised prior art rejections set forth below.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 18-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Naya (US 2002/0196420).

Naya teaches a near-field exposure system or apparatus and a method for imaging a photosensitive material or resist with exposure light having a predetermined wavelength passed through a near-field exposure mask having a pattern of openings each having a dimension (such as a width perpendicular to the lengthwise direction of the opening) that is smaller than the wavelength of the exposure light (title, abstract, paragraphs [0010], [0015]). The use of a laser light source for the exposure light is becoming mainstream [0006]-[0007]. A laser light source can provide linearly polarized exposure light [0067] (*instant claim 18*). In order to ensure sufficient near-field light exposure, the resist 11 is closely contacted to a near-field mask 14 during exposure (as shown in Figure 2, [0052], [0057]). When the mask has pattern openings constituted by lines extending in more than one direction (which encompasses a mask having an opening formed with lengthwise directions extending in plural directions), circularly polarized exposure light (that is polarized in a direction other than those of the opening lengthwise directions on the mask) should be used to prevent uneven exposure or thickening of imaged lines from the mask opening having different lengthwise directions so that a fine pattern in the resist can be formed during exposure [0070]-[0071] (*instant claim 1*). The direction of a linear polarization is optionally adjusted or controlled by a polarizer plate that is rotated to a desired position based on the (detected) direction(s) of lines in the mask opening pattern ([0024], which enables the polarization to be selected in any desired direction with respect to plural lengthwise directions of lines in the mask opening). As shown in Figure 4, linearly polarized exposure light from a light source 36 (such as a laser light source) is passed through a quarter-wavelength plate 30 (a quarter waveplate) to convert or transform the linearly polarized light into circularly

polarized exposure light, which is applied through the near-field photomask 14 openings onto the photoresist 11 [0067]-[0071] (*instant claims 19-20*).

Claims 1, 4, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Kuroda et al. (US 6,171,730) or Kuroda et al. (US 6,187,482) in view of Naya (US 2002/0196420) and especially in view of Hamilton (US 4,639,740).

Kuroda et al. '730 teach a near field evanescent light exposure process and a near field exposure apparatus that includes a near field mask having an opaque shading layer with aperture widths of about 100 nm or less (title, abstract), but preferably the aperture widths are in the range of 1-100 nm, as shown by Figures 2A and 2B, col. 5 line 41 to col. 6 line 40). Col. 1 lines 13-25 suggest that the presently used near field ultraviolet (UV) laser light source (*instant claim 18*) has a wavelength at about 0.1  $\mu$ m (100 nm) or larger, which is understood to mean that the opaque shading layer aperture width is less than the wavelength of exposure light so that the ratio of the aperture width to the wavelength of exposure light must be between 1 and 1/100, or even smaller. Figures 1A and 1B show close contact between the mask 106 and the resist 107 during exposure (col. 3 lines 58-67 and col. 5 lines 9-24). Figure 2A shows rectangular block form L-shaped slit openings in the opaque shading layer on the near field mask (col. 6 lines 40-42, which reads on *instant claim 4* for resist exposure through a near field mask having an opening formed with lengthwise directions extending only in mutually orthogonal directions).

Kuroda et al. '482 teach a near field mask for evanescent light exposure and an apparatus for making a pattern using the near field mask (title, abstract). The mask includes a transparent base or substrate 201 and a metallic thin film shading member 203 having minute apertures 204, each having a width < 100 nm, which is small in comparison with the wavelength of exposure

Art Unit: 1756

light (abstract, Figure 2, col. 4 lines 49-54). Figure 1 shows a laser 101 for projecting laser light 102 for exposure (*instant claim 18*) towards a mask 106, which is in close contact with a resist 107 during the exposure (col. 4 lines 1-2, 30-32, and 35-36). Figure 3A shows hook-shaped (rectangular block form L-shaped) slit openings 303 having two perpendicular lengthwise directions in the opaque shading layer on the near field mask (col. 8 lines 10-14, which reads on *instant claim 4* for resist exposure through a near field mask having an opening formed with lengthwise directions extending only in mutually orthogonal directions).

Neither Kuroda et al. '730 nor Kuroda et al. '482 specifically teach exposure with circularly polarized light.

The teachings of Naya are discussed above.

Hamilton teaches the well-known use of a quarter waveplate to transform a linearly polarized light beam (e.g., from a laser light source, etc.) into a circularly polarized light beam (front page Figure 2, col. 2 lines 24-27).

It would have been obvious to one of ordinary skill in the art at the time of the invention in a near field exposure method utilizing a near field mask including a shading member or a light shielding layer having an opening formed with lengthwise directions extending in different directions or extending only in mutually orthogonal directions (as taught by Kuroda et al. '730 or Kuroda et al. '482, *instant claim 4*) to use circularly polarized exposure light (it has been well known for many years that a quarter waveplate can be used to transform a linearly polarized light beam (e.g., from a laser light source, etc.) into a circularly polarized light beam, as taught by Hamilton, *instant claims 18-20*) for such a near field exposure method (*instant claim 1*), because the use of circularly polarized exposure light would reasonably be expected to prevent uneven

exposure or undesirable thickening of lines imaged from the near field mask opening formed with lengthwise directions extending in different directions (or extending only in mutually orthogonal directions as taught by Kuroda et al. '730 or Kuroda et al. '482) so that a fine uniformly exposed pattern can be formed in the underlying photoresist (as taught by Naya).

*Response to Arguments*

Applicants' arguments on pages 13-14 of the current 2/12/07 amendment with respect to claims 1, 4, and 18-20 have been considered, but they are moot in view of the new ground(s) of rejection presented above, which are necessitated by the current amendment.

In particular, Applicants are directed to the previously cited Naya reference described above. Naya teaches that circularly polarized exposure light is beneficial when the near field exposure mask has pattern openings constituted by lines extending in more than one direction (which encompasses a mask having an opening formed with lengthwise directions extending in plural directions), in order to prevent uneven exposure or undesirable thickening of imaged lines from the mask opening having different lengthwise directions, so that a fine pattern in the resist can be formed during exposure [0070]-[0071]. It has also been well known for many years that a quarter waveplate can be used to transform a linearly polarized light beam (e.g., from a laser light source, etc.) into a circularly polarized light beam (as taught by Hamilton and exemplified by Naya for near field exposure of a photoresist through a near field mask opening formed with lengthwise directions extending in different directions).

***Conclusion***

Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

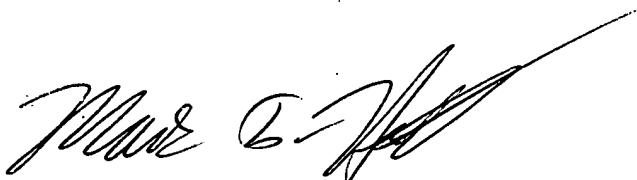
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Ruggles whose telephone number is 571-272-1390. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jsr



MARK R. HUTZ  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700